REMARKS

This is in response to the Official Action currently outstanding regarding the above-identified application, which Official Action the Examiner has designated as being FINAL.

Claims 1-47 were pending prior to the Examiner's Requirement for Restriction of 10 April 2001. As a result of Applicants' response to that Requirement for Restriction, Claims 15-28, 30 and 38-47 were withdrawn from further consideration in this application, without prejudice. Claims 1-14, 29 and 31-37, therefore, constituted the claims to which the Official Action of 15 April 2002 (as reissued on 16 May 2002) is directed. By the Amendment of 16 August 2002, Claims 2, 9 and 12 were canceled, without prejudice; Claims 1, 3, 6, 10, 13, 14, 29 and 31 were amended; and New Claim 48 was added. Accordingly, Claims 1, 3-8, 10, 11, 13-14, 29, 31-37 and 48 constituted the claims under active prosecution at the time of the issuance of the currently outstanding FINAL Official Action. By the foregoing, Applicant proposes a further amendment of the independent claims of this application; namely, Claims 1, 6, 29 and 31, for the purpose of placing this application in condition for allowance, or at least in better form for Appeal, as required by 37 CFR 1.116.

Pursuant to the Rules, a "**VERSION SHOWING CHANGES PROPOSED TO BE MADE TO THE CLAIMS**" is attached hereto.

In the currently outstanding Official Action, the Examiner has:

1. Acknowledged Applicants' claim for foreign priority under 35 USC 119(a)-(d) and also acknowledged the receipt of the required certified copy of the priority documentation by the United States Patent and Trademark Office.

2. Provided Applicants with a copy of a Notice of References Cited (Form PTO-892) and copies of each of the references cited therein.

3. FINALLY rejected Claims 1, 3-8, 10, 11, 13, 14, 29, 31-37 and 48 under 35 USC 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

4. FINALLY rejected Claims 1, 3-8, 10, 11, 13, 14, 29, 31 –37 and 48 under 35 USC 103(a) as being unpatentable over the Mori et al reference (US Patent 5,559,618) in view of the Wu SID '95 article previously cited, the Wu Materials, Chemicals and Physics article presently cited, the Bosma et al reference (US Patent 5,760,859), the Nishimura et al article previously cited, and the Herke article presently cited.

5. Provided Applicant with his response to the argument presented in reply to the Official Action of 15 April 2002 (as reissued on 16 May 2002).

No further comment regarding items 1 and 2 above is deemed to be required in these Remarks.

With respect to items 3-5, the Examiner has reasserted his rejection under 35 USC 112, first paragraph, arising from the wording of the independent claims "*the index of anisotropy is specified to vary with wavelengths of rays of light within a range that allows no viewing angle dependent coloration to occur on a displayed image*". In particular, the Examiner has declared that Applicant's arguments (specifically including those appearing at page 10, line 1 to page 13, line 14; page 15, line 1 to page 16, line 14; and page 19, lines 1 to 21 of the Amendment dated 16 August 2002) are not persuasive and effectively suggested that they have been disregarded. As a result, the Examiner's position is understood by the Applicant to effectively be that the present invention is not appropriately enabled ***if the result of the present invention is not inherent to prior art devices such as Mori, et al.***, and that in any event the presently pending claims are unpatentable under 35 USC 103(a) over the Mori, et al reference in view of the Wu series of references.

Applicant now has carefully reviewed the present specification and claims in view of the Examiner's comments. As a result, Applicant is proposing that the pending independent claims be amended and that their respective formats be altered slightly so as to more clearly and definitely set forth the subject matter that Applicant regards as his invention.

Specifically, it is being proposed that the wording of the independent claims be altered slightly so as to clarify the fact that the present invention is concerned with insuring that substantially no viewing angle dependent coloration appears in images displayed by the ***device*** claimed. As previously worded, the claims conceivably might have been read as referring to viewing angle dependent coloration in images appearing at the surface of the liquid crystal layer sandwiched by the substrates. The latter is not what is being claimed.

In addition, Applicant now is proposing amendments to the independent claims that, if entered, will more specifically characterize the claimed phase difference plate. The effect of these amendments, if entered, will be to further distinguish the present invention from the Mori, et al. reference and at the same time to further demonstrate that the Examiner's previous positions on the enablement issue raised by him have been overcome. Further, as will appear more fully below, the limitations proposed for addition to the pending independent claims by this amendment were inherently part of the claims as previously presented in that they are specifically supported in the present specification that determines how the words of the claims should be construed. Accordingly, Applicant respectfully submits that no new matter will be added to this application in the event that entry of the foregoing amendments is granted, and further that since the claims as amended will include only subject matter heretofore present therein (at least inherently), no new issue requiring further consideration and/or search will be raised by their entry at this stage of these proceedings.

In addition, Applicant respectfully submits that the above-proposed amendments to the pending independent claims definitively differentiate the present invention from the combination of references relied upon by the Examiner in support of his rejections in a manner that the Examiner has invited by his comments to the effect that the United States Patent and Trademark Office can shift the burden of showing patentablity to the Applicant ***when the structure is shown by the prior art but the claimed function is not***.

Applicant respectfully submits as well that an invitation to make the foregoing amendments to the independent claims of this application is inherent in the Examiner's comments in the Response to Arguments section of the currently outstanding Official Action in this case indicating;

> "(a)pplicant is silent on the phase plate, and clearly, any method of improving viewing angle characteristics would require a ratio between the two. *(meaning between the liquid crystal material and the phase plate)* If applicant is using the ratio as taught by the prior art, then the prior art would have to achieve the result. If applicant is using a different ratio, applicant would have to disclose what the ratio is to have enablement. To simply disclose one parameter, and not the others is clearly lacking."

Accordingly, it will be understood that as hereinabove amended the independent claims of this application indicate with particularity that a phase difference plate of the present invention is arranged in such a manner that the direction of the principal refractive index n_a coincides with the direction of a y-coordinate axis that is orthogonal to the normal (i.e., a z-coordinate axis in an x-y-z coordinate system in which the x and y coordinate axes are located in the plane of the surface of the phase plate). The direction of the principal refractive index n_b, on the other hand, is inclined (i.e. disposed at an angle) relative to the normal (i.e., the z axis) and relative to the x-coordinate axis, and the principal axes n_a, n_b, and n_c are mutually related to one another according to the relationship $n_a < n_b < n_c$. Further, in this phase difference plate the refractive index n_a (i.e., the y-axis) is the rotation axis about which the n_b and n_c perpendicular axes are shifted, and the value of n_a is smaller than either n_b or n_c. These limitations find specific support at page 22, line 21 to page 23, line 3 and Fig. 3 of the present specification.

The foregoing is to be contrasted with the phase difference plate of the Mori, et al. reference that is a biaxial phase difference plate in which a principal refractive index nz is inclined with respect to the normal by being rotated about the direction of the principal refractive index nx, where the refractive indices are mutually related to one another according to the relation nx > nz > ny. In this regard, it further will be understood that in the Mori, et al. phase difference plate, the principal refractive index nx (located on the x-coordinate axis of an x-y-z coordinate system wherein the x and y axes are located in the plane of a surface of the phase plate) is the rotation axis and is larger than either ny or nz.

Accordingly, while both the Mori, et al phase plate and the phase plate of the present invention may be correctly characterized as being "biaxial", it will be readily recognized that they respectively have totally different optical characteristics. This important because the present invention is premised on the assumptions that (i) an inclined biaxial phase plate in which $n_a < n_b < n_c$ and in which the principal refractive index n_a coinciding with the y-coordinate axis of the conventional x-y-z coordinate system that is utilized to characterize the relationships of the principal refractive indices of a phase plate is the rotation axis of the phase plate is adopted, and (ii) the wavelength dispersion of the liquid crystal material that is the target of optical compensation is arranged to be within an optimum range for the reduction of viewing-angle dependence in conjunction with that phase plate.

Stated slightly differently, it is not possible to obtain the results of the invention as now claimed by combining the Wu series of references with the Mori, et al reference. This is because Mori, et al describes a phase difference plate that has optical properties totally different from those provided by the phase plate of the present invention. It also is because the Examiner has failed to demonstrate that the claimed liquid crystal materials are "conventional" in the face of Applicant's assertion that they are "non-conventional".

In the latter regard, it is so well understood as not to require citation to specific authority that claims are to be interpreted in light of the specification. Further, in this case, the specification itself clearly indicates that in addition to the general functional requirement claimed, one or both of two specified conditions are useful in determining whether or not a particular liquid crystal material falls within the scope of the present invention. These two conditions are set forth clearly in the specification and claims as follows:

> 1) "Δn (450) – Δn (650), i.e., the difference between the refractive index anisotropy Δn (450) of the liquid crystal material for rays of light having the wavelength of 450 nm and the refractive index anisotropy Δn (650) thereof for rays of light having the wavelength 650 nm, is set in a range not less than 0.0070 to not more than 0.0250. The difference is more preferably set in a range not less than 0.0200 to not more than 0.0250." (Page 26, lines 15 to22)
>
> 2) "The refractive index anisotropy Δn (550) of the liquid crystal material for rays of light having the wavelength 550 nm is set to be larger than 0.060 and smaller than 0.120. More preferably, the refractive index anisotropy Δn (550) is set to be not less than 0.070 and not more than 0.095." (Page 28, Lines 4 to 9)

Applicant respectfully submits that the foregoing is clearly sufficient to establish enablement without the necessity of the specification of particularized ratio values in either the present specification or the claims that the Examiner appears to require.

In addition, in the Wu reference the birefringence of STN mixtures is stated to normally be in the range from 0.15 to 0.20, and for TN mixtures in the range from 0.08 to 0.10. The wavelength-dependent birefringence, however, at a wavelength of 589nm for ZLI-1565 is stated to be 0.13, and for E-63 to be 0.22. Hence, since the claims are discussing **wavelength-dependent values**, and the disclosed wavelength dependent values are outside of the normal range for either STN or TN type LCD materials, it is not seen how the Examiner can justify his statement that the ranges disclosed in the art are the same as those herein claimed in view of these contrary statements in the references. Note that similar results appear to be the case for the ZLI-4792 disclosed by Ong; $\Delta n = 0.094$ (within the normal TN range), and by Bos regarding ZLI-5040-100, $\Delta n = 0.21$; and ZLI-1132, $\Delta n = 0.14$, **all without reference to wavelength dependent Δn**.

Additionally, it will be seen that Wu refers to a wavelength dependent birefringence of ZLI-2857 ***at 632.8 nm as being 0.072***. Neither Wu nor Bosma et al, however, clearly disclose wavelength dependent birefringence values of the latter material at any other wavelength. Hence, it is assumed from the Examiner's reference to so-called dispersion charts, that the Examiner has attempted to extrapolate birefringence values mathematically therefrom.

If this indeed is the basis of the Examiner's allegations that the material of the liquid crystal display element of the present invention is a material commonly in use in the prior art (***as the Examiner now appears to admit in the present FINAL Official Action***), Applicant respectfully submits that such an imperfect recreation of the supporting data from the charts is notoriously unreliable. Indeed, Applicant's mathematical extrapolations from the same charts as those apparently utilized by the Examiner indicate that Δn (500) for the ZLI-1565 material, for example, is about 0.13+, and for the same material the Δn (450) – Δn (650) is about 0.15. These values are clearly outside of the ranges herein claimed.

The conclusion, therefore, is respectfully submitted to be inescapable that the Examiner has failed to show the materials claimed for the liquid crystal layer of this invention in common use for a similar purpose in the prior art. Certainly, a mathematically derived value for Δn (550) based upon notoriously questionable variable values derived from an unclear graph is insufficient to support the Examiner's current position. The definitive nature of the alleged disclosure is totally lacking, and it disregards the other pervasive limitations of the claims.

Consequently, it follows that given the fact that as amended the claims of this application now provide the particulars of the phase plate heretofore suggested by the Examiner not to be present therein (despite their specific recitation in the present specification), the foregoing amendment removes the basis of the Examiner's lack of enablement rejection as well as his obviousness rejection. In particular, given that the specific definition of the phase plate sought by the Examiner for inclusion in the claims now has been supplied and that the non-conventional nature of the liquid crystal material claimed (and described in the specification) has not been adequately refuted by the Examiner, Applicant clearly now has provided the parameters for the practice of his invention that the Examiner has suggested to be necessary.

In view of the foregoing Amendment and Remarks, it is believed that all of the claims that will be present in this application in the event that the Examiner grants the entry of the foregoing Amendment are in condition for allowance. Reconsideration and allowance of this application in response to this communication, therefore, is respectfully requested.

Applicants believe that additional fees are not required in connection with the consideration of this response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. **04-1105**, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

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VERSION SHOWING CHANGES PROPOSED TO BE MADE TO THE CLAIMS

Additions shown underlined; Deletions shown in brackets.

Please amend Claims 1, 6, 29 and 31 as follows:

1. (Four Times Amended) A liquid crystal display device, comprising:

a liquid crystal display element including:

a pair of substrates[;] , and

a liquid crystal layer sandwiched by [the] said substrates;

a pair of polarizers disposed so as to sandwich [the] said liquid crystal display element; and

at least one phase difference plate , each of said at least one phase difference plate defining a surface and being disposed between [the] said liquid crystal display element and [the] said pair of polarizers[,] ;

wherein [the] (i) each of said at least one phase difference plate has three principal refractive indices n_a, n_b, and n_c , (ii) said refractive indices are [being] mutually related by the inequality $n_a<n_b<n_c$, [wherein the] (iii) the direction of said principal refractive index n_a coincides with the direction of a y – coordinate axis among x and y – coordinate axes on said surface, said y – coordinate axis being orthogonal to said normal, and (iv) the direction of said principal refractive index n_b inclines relative to the normal to [a] said surface and to the direction of said x-coordinate axis [of the phase difference plate], and

wherein the refractive index anisotropy Δn (550) of [the] said liquid crystal material for rays of light having the wavelength of 550 nm is specified to be more than 0.060 and less than 0.120 , and

wherein the refractive index anisotropy of said liquid crystal material varies with other wavelengths of rays of light within a range that allows substantially no viewing angle dependent coloration to occur in an image displayed by said device.

6. (Twice Amended) A liquid crystal display device, comprising:

a liquid crystal display element including :

a pair of substrates[;] , and

a liquid crystal layer sandwiched by [the] said substrates;

a pair of polarizers disposed so as to sandwich [the] said liquid crystal display element; and

at least one phase difference plate , each of said at least one phase difference plate defining a surface and being disposed between [the] said liquid crystal display element and [the] said pair of polarizers[,] ;

wherein [the] each of said at least one phase difference plate (i) has three principal refractive indices n_a, n_b, and n_c [being] , (ii) said refractive indices are mutually related by the inequality $n_a<n_b<n_c$, [wherein] (iii) the direction of said principal refractive index n_a coincides with the direction of a y – coordinate axis among x and y – coordinate axes on said surface, said y – coordinate axis being orthogonal to said normal, and (iv) the direction of the principal refractive index n_b inclines relative to the normal to [a] said surface and to the direction of said x-coordinate axis [of the phase difference plate], and

wherein (i) the refractive index anisotropy Δn (550) of the liquid crystal material for rays of light having the wavelength of 550 nm is specified to be more than 0.060 and less than 0.120, [and wherein] (ii) Δn (450) - Δn (650), i.e., the difference between the refractive index anisotropy Δn (450) of the liquid crystal material for rays of light having a wavelength of 450 nm and the refractive index anisotropy Δn (650) thereof for rays of light having the wavelength of 650 nm, is specified to be not less than 0.0070 and not more than 0.0250, and (iii) the refractive index anisotropy of said liquid crystal material varies with other wavelengths of rays of light within a range that allows substantially no viewing angle dependent coloration to occur in an image displayed by said device.

29. (Twice Amended) A liquid crystal display device, comprising:

a liquid crystal display element including a liquid crystal layer sandwiched by a pair of light-transmitting substrates each having an electrode layer provided thereon;

a pair of polarizers disposed so as to sandwich [the] said liquid crystal display element; and

at least one phase difference plate ,each said phase difference plate defining a surface and being disposed between [the] said liquid crystal display element and [the] said pair of polarizers,

wherein the improvement comprises [that] (i) each of said [the] at least one phase difference plate [has] having three principal refractive indices n_a, n_b, and n_c being mutually related by the inequality $n_a < n_b < n_c$, [and] the direction of the principal refractive index n_a coinciding with the direction of a y-coordinate axis among x and y-coordinate axes on each said surface of said at least one phase difference plate, the y-coordinate axis being orthogonal to said normal, and the direction of the principal refractive index n_b [inclines] inclining relative to the normal [of a] to said surface [of said at least one phase difference plate] and to the direction of said x-coordinate axis, and [that], (ii) [the liquid crystal layer is constituted by a liquid crystal material wherein] the refractive index anisotropy Δn (550) of the liquid crystal material for rays of light having the wavelength of 550 nm [is] being specified to be more than 0.060 and less than 0.120, [and wherein]

(iii) Δn (450) - Δn (650), i.e., the difference between the refractive index anisotropy Δn (450) of the liquid crystal material for rays of light having a wavelength of 450 nm and the refractive index anisotropy Δn (650) thereof for rays of light having the wavelength of 650 nm, [is] being specified to be not less than 0.0070 and not more than 0.0250, [such that] and (iv) the refractive index anisotropy [thereof] of said liquid crystal material being [is] specified to vary with other wavelengths of rays of light within a range that allows substantially no viewing-angle dependent coloration to occur on a displayed image.

31. (Twice Amended) A liquid crystal display device, comprising:

a liquid crystal display element including:

a pair of substrates[;] , and

a liquid crystal layer sandwiched between [the] said substrates;

a pair of polarizers disposed so as to sandwich [the] said liquid crystal display element; and

at least one phase difference plate , each said at least one phase difference plate defining a surface and being disposed between [the] said liquid crystal display element and [the] said pair of polarizers,

wherein (i) [the] each of said at least one phase difference plate has three principal refractive indices n_a, n_b, and n_c [being] mutually related by the inequality $n_a < n_b < n_c$, [and] (ii) the direction of the principal refractive index n_a coincides with the direction of a y-coordinate axis among x and y-coordinate axes on each said surface of said at least one phase difference plate, the y-coordinate axis being orthogonal to said normal, and (iv) the direction of the principal refractive index n_b inclines relative to the normal [of a] to said surface and to the direction of said x-coordinate axis[of said at least one phase difference plate];

wherein Δn (450) - Δn (650), i.e., the difference between the refractive index anisotropy Δn (450) of the liquid crystal material for rays of light having a wavelength of 450 nm and the refractive index anisotropy Δn (650) thereof for rays of light having the wavelength of 650 nm, is specified to be not less than 0.0070 and not more than 0.0250 , and

wherein the refractive index anisotropy of said liquid crystal material varies with other wavelengths of rays of light within a range that allows substantially no viewing angle dependent coloration to occur in an image displayed by said device.